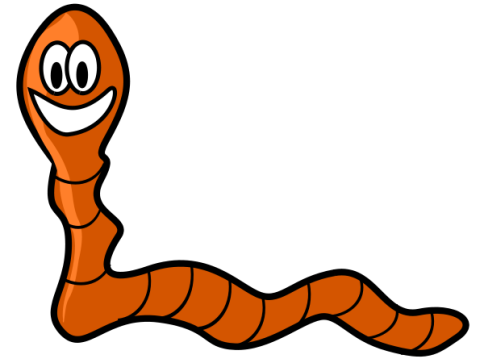
Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period: \_\_\_\_\_\_\_

**Genetic Drift in Driftworms Simulation**

Mrs. Krouse, AP Biology, 2015-2016



**The Goal:** Today we will be investigating the effect of genetic drift in a fictional population of “driftworms.” The main question we will be attempting to answer is as follows: Does population size affect the amount of genetic drift that occurs over several generations?

After reading your Unit 1, Part 4 Notes (Hardy Weinberg Equilibrium), answer the following introductory questions.

1. What is genetic drift?
2. How is genetic drift different from natural selection?

**About The Driftworms:** Our fictional population of driftworms reproduces asexually. This means that each offspring worm only has one parent worm. The offspring worm is identical to the parent worm. Because they reproduce asexually, driftworms only have one allele for each trait, which gets passed from the single parent down to the offspring. We will be investigating the inheritance of the color allele in driftworms. There are five different colors—clear, blue, red yellow, and white. We will use colored beads to represent the driftworms in our population.

**Trial 1 – Smaller Population:** For this trial, you will have a small population of driftworms with only five members. Each member of the original population will be a different color. You will start out with a bag containing five beads to represent the five members of the original population. In Table #1, I have already recorded the color frequencies for this first generation.

1. Stick your hand into your bag of beads and remove one bead. This is your first worm offspring in the second generation.
2. Place a tally mark in the corresponding color under the second generation.
3. Put the bead back in the bag. (Note: You are doing this because each parent in the first generation can have multiple offspring in the second generation.)
4. Repeat steps 1-3 four more times until you have five tally marks in the second generation column for your five offspring worms. Notice that we are maintaining the population size (5 worms) from generation to generation.
5. Once you have five tally marks in the second generation, begin the next round of reproduction with the color frequencies seen in the first generation by exchanging beads with the class supply. For example, if you had three blue babies in your second generation and two red babies, begin your next round of reproduction with three blue beads and two red beads in the bag.
6. Continue this procedure until you have filled in all the columns (through Generation 7).

***Table #1***

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Number of Worms (By Generation) | | | | | | |
|  | 1st | 2nd | 3rd | 4th | 5th | 6th | 7th |
| Clear | 1 |  |  |  |  |  |  |
| Blue | 1 |  |  |  |  |  |  |
| Red | 1 |  |  |  |  |  |  |
| Yellow | 1 |  |  |  |  |  |  |
| White | 1 |  |  |  |  |  |  |

**Trial 2 – Larger Population:** For this trial, you will have a larger population of driftworms with 10 members. There will be two members of this original population that are each color. You will start out with a bag containing 10 beads to represent the 10 members of the original population. In Table #2, I have already recorded the color frequencies for this first generation. Note: You will need to put the 10 beads in your bag yourself!

1. Stick your hand into your bag of beads and remove one bead. This is your first worm offspring in the second generation.
2. Place a tally mark in the corresponding color under the second generation.
3. Put the bead back in the bag. (Note: You are doing this because each parent in the first generation can have multiple offspring in the second generation.)
4. Repeat steps 1-3 four more times until you have 10 tally marks in the second generation column for your 10 offspring worms. Notice that we are maintaining the population size (10 worms) from generation to generation.
5. Once you have 10 tally marks in the second generation, begin the next round of reproduction with the color frequencies seen in the first generation by exchanging beads with the class supply. For example, if you had six blue babies in your second generation and four red babies, begin your next round of reproduction with six blue beads and four red beads in the bag.
6. Continue this procedure until you have filled in all the columns (through Generation 7).

***Table #2***

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Number of Worms (By Generation) | | | | | | |
|  | 1st | 2nd | 3rd | 4th | 5th | 6th | 7th |
| Clear | 2 |  |  |  |  |  |  |
| Blue | 2 |  |  |  |  |  |  |
| Red | 2 |  |  |  |  |  |  |
| Yellow | 2 |  |  |  |  |  |  |
| White | 2 |  |  |  |  |  |  |

**Follow-Up Questions:**

1. Compare the data from Table #1 and Table #2. Describe any differences you notice between the two sets of data. (Try to focus on the number of colors present in each generation.)
2. Explain the differences you noticed based on your knowledge of the impact of genetic drift on smaller vs. larger populations.
3. Explain how this simulation relates to the fixation of alleles. Predict which population—the smaller or larger population—would experience the fixation of an allele first.